BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF CHEMICAL & PROCESS ENGINEERING

B.Sc. AGRO-PROCESSING ENGINEERING

PROFILING OF COMMON CROP RESIDUES FOR BRIQUETE MANUFACTURE CASE EASTERN UGANDA RURAL AREAS

BY

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DECLARATION

I **ODIKOR ROBERT** declare that this write-up is a true accountability of my experience during my project development, and it has been compiled out of my tremendous effort. None of this particular kind has ever been submitted to any institute for any academic related awards.

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BU/UG/2015/15

APPROVAL

This is to confirm that this report documents the experience of **ODIKOR ROBERT** during the course of his research study which was under the oversight of the undersign supervisor

Supervisor

MR. KAVUMA CHRIS

Signature: .....

Date: .....

DEDICATION

I truthfully dedicate this report to my project supervisor(s) and course mates.

ABSTRACT

Despite the fact of several research studies to recycle crop wastes into briquettes, the quality and suitability of the crop residue briquettes remains a core issue for their successful adoption. This success is highly hindered by the briquette manufacturers' lacking a characteristic profile that can be used as a quality predicting tool for briquettes from crop residues. It is due to this reason that, the briquette manufacturers still major in wood and wood charcoal briquettes, rather than diversifying through the crop residue briquetting opportunity. In particular, Agro-processing milling and threshing industries produce large annual volumes of crop residue waste worldwide (Eastern Uganda inclusive). They thus accumulate due to high investment requirements for cogeneration that could utilize these residues which is at the same time not directly suitable for use as household cooking fuel. This research has developed a characteristic profile on the potential of groundnut shells, maize cobs, rice husks, cassava and sweet potato peel crop residues to guide briquette manufacturers. For this research, samples were collected from the villages of Syaule and Busitema, Busitema sub-county, Busia district in Eastern Uganda. Samples were then cleaned, dried, carbonized, ground and briquetted using molasses. Based on the specific objectives of the study, the characteristic profile of groundnut shells, maize cobs, rice husks, cassava and sweet potato peel crop residue was developed. The research was scoped and objected to characterizing the crop residue based on; the moisture content, volatile matter, ash content, percentage fixed carbon, calorific value and chemical element (O_2, H, C, N and S). As well, the performance of these crop residue briquettes was assessed and the corresponding profile was developed. The briquette performance assessment was based onto comparison of the briquette properties of the crop residue. Such properties covered in this study includes: the moisture content, volatile matter, ash content, percentage fixed carbon, calorific value, ignition time, durability/longevity, density, porosity and water boiling test.

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CHAPTER ONE: BACKGROUND

1.1 Introduction

Biomass as a source of energy consists of any organic material that can be used as a fuel. Example of biomass fuel sources include: agricultural residues, firewood, forest wastes, dung and vegetable matter. Energy from biomass accounts for 15% of global energy. The biomass fuels have throughout been known to be a cheap, accessible and reliable source of fuel for developing African countries. However, this is unlikely to continue as high dependency on biomass inform of firewood and charcoal is raising concerns for the sustainability of the resources as human population increases. (Ferguson, 2012).In Uganda today, biomass fuels remain the most promising and affordable energy resource for cooking and heating (UBOS, 2014)

The (UBOS, 2014) Census reported that; 71 percent of the households used firewood for cooking with 85 percent in the rural and 31 percent in the urban areas, while, 23% with 12% in rural and 58% in urban use charcoal Figure 1: Showing Uganda's cooking energy patterns . Firewood was most commonly used by rural households (86%) while charcoal is commonly used in urban areas (70%).

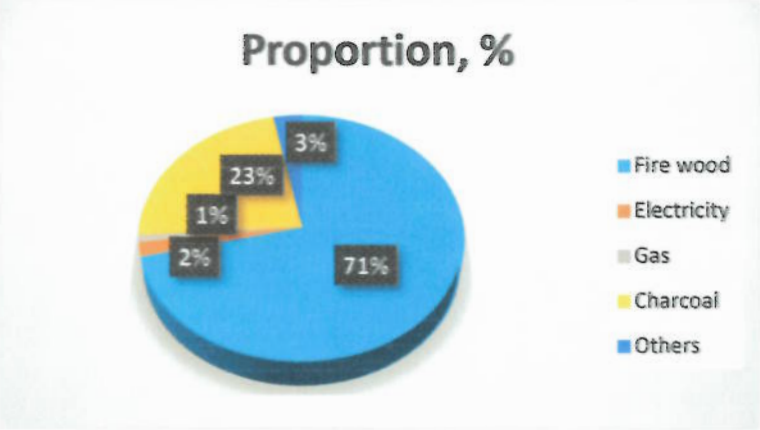

Figure 1: Showing Uganda's cooking energy patterns (UBOS, 2014)

According to (MEMD, 2008), about 1.2 million tons of agricultural residues are produced in Uganda annually. Unfortunately, these residues are disposed or burnt openly to reduce on their volumes without any pre-treatment or utilization. According to (Singh, 2015), the open air

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